

Year 10 paper 1 Mark scheme 2011

1. (a) Any Gp1 element name/symbol 1
 (b) Copper/Cu 1
 (c) Any element from boron to neon name/symbol 1
 (d) Iodine/I or Astatine/At 1
 (e) Aluminium/Al 1
(Total 5 marks)

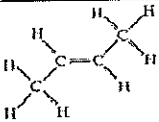
2. (a) metals 1
 (b) allotropes 1
 (c) alkalis 1
 (d) ions 1
 (e) isotopes 1
(Total 5 marks)

3. (a) solid ☐
 liquid ☐
 gas ☐
 (one correct = 1 mark, all correct = 2 marks) 2
 (b) air – gas 1
 iron – solid 1
 water – liquid 1
 (c) 0 1
 noble gases 2
 (d)(i) solid to liquid 2
 (ii) gas to liquid 2
 (iii) liquid to gas 2
(Total 13 marks)

4.

a	M1	covalent		1
b	M1	low		1
	M2	weak	If high given for M1, then accept strong	1
	M3	molecules		1
			Mark b independently except that if high given for M1, then accept strong for M2	
c	M1	shared pairs of electrons between O and both H atoms	Electrons can be shown as dots / crosses / e / any combination of these	1
	M2	two electrons in O inner shell AND four more electrons in O outer shell AND no extra electrons in H	Accept these electrons paired or unpaired	1
			M2 dependent on M1	

6 marks

5	(a)	i	C_nH_{2n}		1
		ii	Any two from: <ul style="list-style-type: none"> (neighbouring) members differ by $-CH_2-$ same / similar chemical properties gradation in physical properties 	ACCEPT same functional group	2
(b)		i	 but-2-ene	1 mark for formula 1 mark for name	2
		ii	cyclobutane: no change/remains orange but-1-ene: (bromine) turns colourless/decolourised		2
(c)			An explanation linking the following points: <ul style="list-style-type: none"> crude oil contains too many long chain hydrocarbons which are economically less useful / need converting to more economically useful smaller hydrocarbons 	ACCEPT <ul style="list-style-type: none"> alkenes need in polymer industry to make useful plastics 	2
(d)		i	$C_{10}H_{22} \rightarrow C_8H_{18} + C_2H_4$ 1 mark for correct formula for alkane 1 mark for balanced equation	ALLOW equations which finish: $\rightarrow C_8H_{18} + 2C_2H_4$ $\rightarrow C_4H_{10} + 3C_2H_4$ $\rightarrow C_2H_6 + 4C_2H_4$	2
		ii	An explanation linking the following points: <ul style="list-style-type: none"> toxic / poisonous (because) it restricts blood carrying oxygen 	ACCEPT comments about binding to haemoglobin	2
(e)		i	nitrogen and oxygen	ACCEPT N_2 and O_2	1
		ii	nitric acid/ HNO_3	ACCEPT nitrous acid / HNO_2	1
		iii	kills fish / aquatic life / trees / plants / damages buildings	ACCEPT leaches minerals from soil	1
					Total: 16

6. (a)

i(i)	Any two from: Fizz / bubble Move / darts around Melts / forms a ball / Gets smaller / disappears (reject dissolves)	2
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Question number	Answer	Mark
i(ii)	Sodium + water → sodium hydroxide + hydrogen (accept correct formulae equation)	1

(b)

b	i	M1	helium / beryllium / magnesium / calcium / strontium / barium / radium / He / Be / Mg / Ca / Sr / Ba / Ra	1
	ii	M1	hydrogen / helium / H / He	1
			Accept H ₂	

(c)

	Blue / purple (solution made is) alkaline / (contains) hydroxide ions OH ⁻ / not just 'alkali metal' pH 11→14 (any in range)	2
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Question number	Answer	Mark
(d)	<ul style="list-style-type: none"> Electrons being transferred between oxygen and sodium (can be wrong way round) Idea of sodium losing electron(s) and oxygen gaining electron(s) Correct number of electrons involved (sodium lose 1, oxygen gain 2) (sharing = 0 marks)	3

10 marks

7	(a)	i	2		1
		ii	An explanation linking the following points: <ul style="list-style-type: none"> reaction rate slows down (because there are) fewer hydrogen peroxide particles (therefore) less frequent collisions/fewer collisions per second 	ACCEPT hydrogen peroxide is less concentrated	3
		iii	35	ACCEPT a number between 30 and 35	1
	(b)		relights a glowing spill/splint		1
	(c)	i	C		1
		ii	E		1
		iii	A		1
					Total: 9

8.

(a)	An explanation linking the following points: • 8 electrons in outer(most) shell • does not easily/readily gain or lose electrons	ACCEPT full outer(most) shell ACCEPT argument based on energy required	2
(b)	8 electrons in middle shell 7 electrons in outer shell	ACCEPT dots, circles, crosses or e to represent electrons	2
(c) i	$2\text{Cl}^- + \text{I}_2$	1 mark - correct formulae 1 mark - correct balancing	2
ii	displacement/redox	oxidation and reduction	1
iii	iodine	I_2	1

(d)(i)	Red / pink (hydrobromic acid formed / H^+ ions present)	2
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Question number	Answer	Mark
(d)(ii)	Blue No acid formed / no reaction / no H^+ ions	2

12 marks

9.

(a)	Bitumen Gasoline Bitumen	3
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Question number	Answer	Mark
(b)	Cracking Heat / 400-1000 °C / high temperature (reject boil) Steam / catalyst / (high) pressure / 5-100 atm	3

Question number	Answer	Mark
(c)(i)	$2\text{CH}_4 + 3\text{O}_2 \rightarrow 2\text{CO} + 4\text{H}_2\text{O}$ All formula correct (1 mark) Formula balances (1 mark)	2

Question number	Answer	Mark
(c)(ii)	Toxic / poisonous / death / fatal (reject suffocate) Correct reference to blood or haemoglobin	2

10.

a	M1	cross in box 1		1
	M2	cross in box 4		1
b	M1	filter or filtration / centrifuge and decant	Accept description of process Reject any wrong method	1
c	M1	wash (with water) / add water and filter	Accept description of process	1
	M2	dry / heat / warm / evaporate / leave in warm place / spread onto filter paper / place in (warm) oven	Accept description of process Ignore wrong consequence (eg heat to remove sodium nitrate)	1
			If M1 and M2 in wrong order, award 1/2 Reject any wrong method in both M1 and M2	

5 marks

Question Number	Answer	Mark
11(a)(ii)	Point at (46,65) circled	1

Question Number	Answer	Mark
11(a)(iii)	Any one from: <ul style="list-style-type: none"> Marble chips bigger / surface less Acid too cool Volume of acid too small Mass of chips too small Acid more dilute - or reason that could cause this 	1

Question Number	Answer	Mark
11(b)(i)	Read values from graph: 76 ± 1 cq 45 ± 1	2

Question Number	Answer	Mark
11(b)(ii)	cq on (i): 0.013 0.022 min 2 significant figures	2

Question Number	Answer	Mark
11(b)(iii)	(the higher the temperature the) faster (the reaction) cq on (ii)	1

11(b)(iv)	<ul style="list-style-type: none"> Particles have more energy Move faster / more have energy greater than activation energy More collisions per second / more frequent collisions greater proportions of collisions are successful 	3
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Question Number	Answer	Mark
11(c)	Any suitable way of cooling flask / contents, eg an ice bath Do not accept ideas based on doing the reaction somewhere else.	1

12.

(a)	Heat	1
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Question number	Answer	Mark
(b)(i)	Diffusion	1

Question number	Answer	Mark
(b)(ii)	Ammonium chloride / NH_4Cl	1

(b)(iii)	Ammonia faster / hydrogen chloride slower	1
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Question number	Answer	Mark
(b)(iv)	A: Red B: Blue	2

6 marks

13 (a)	An explanation linking the following points: <ul style="list-style-type: none"> reaction rate is faster (therefore) counting bubbles is more difficult / bubbles may form continuous stream 	ACCEPT: <ul style="list-style-type: none"> bubbles may be different size so not valid / poor comparison with first experiment 	2
(b)	A description linking the following points: <ul style="list-style-type: none"> measure the volume of gas produced using a graduate test-tube / gas syringe / inverted measuring cylinder 	ACCEPT: <ul style="list-style-type: none"> answers which lead to decreased rate to allow bubble counting to work e.g. reduced concentration of acid / larger pieces of zinc 	2

c)

(a)(i)	Shared pair of electrons	1
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Question number	Answer	Mark
(a)(ii)	$\text{H} \times \text{H}$ (accept two \times or two \cdot)	1

d)	Hydrogen + oxygen \rightarrow water	1
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(e)	any named gas that burns in oxygen to form water as a product e.g. methane	ACCEPT correct formula for gas	1
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1

f) carbon dioxide

9 marks